11-1-1954

Test 530: David Brown Model 25 (Gasoline)

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: November 1 to November 6, 1954
Manufacturer: DAVID BROWN TRACTORS (ENGINEERING) LTD., MELTHAM, HUDDERSFIELD, YORKSHIRE, ENGLAND
Manufacturer's Rating: Not rated

NEBRASKA TRACTOR TEST NO. 530

DAVID BROWN 25 GASOLINE

FUEL, OIL and TIME Gasoline Octane No. ASTM 79 Research 84.5 (rating taken from oil company's typical inspection data): **weight per** gallon 6.131 lb **OIL** SAE 30; **to motor** 1.578 gal; **drained from motor** 1.282 gal **Total time motor was operated** 45 hours.

CHASSIS Type Standard **Serial No.** P25/15803 **Tread width** rear 48" to 68" front 49½" to 62" **Wheel base** 74 ⅜" **Hydraulic control system** operates when clutch is engaged **Advertised speeds mph** first 1.53 second 2.84 third 3.77 fourth 5.64 fifth 7.00 sixth 13.9 reverse 2.46 and 6.08 **Belt pulley diam.** 8½" face 5¾" **rpm** 1400 and 2282 **Belt speed** 3110 and 5075 fpm **Clutch** single plate dry disc clutch operated by foot pedal **Seat** pressed steel seat with rubber puck suspension **Brakes** internal expanding shoe operated by two foot pedals **Equalized** by locking two brakes together **Power take-off** conventional type.

ENGINE Make David Brown **Type** 4 cylinder vertical **Serial No.** AG4/3/3½/7617 **Crankshaft mounted** lengthwise **Head I Lubrication** pressure **Bore and stroke** 3.5" x 4" **Rated rpm** belt 2000 drawbar 1600 **Compression ratio** 7.00 to 1 **Displacement** 154 cu. in. **Port diameter valves** inlet 1.406 exhaust 1.207 **Governor** variable speed centrifugal **Carburetor size** 30 mm. **Ignition system** 12 volt **Starting system** 12 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable treated paper element **Cooling medium temperature control** thermostat and radiator curtain.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J & K were made with the same setting of the carburetor (selected by the manufacturer). A small amount of oil leaked from belt pulley gear box during the belt test.

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hour	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TESTS B & C—100% MAXIMUM LOAD—TWO HOURS								
34.89	2000	3.281	10.63	0.577	0.00	162	59	29.097
TEST D—RATED LOAD—ONE HOUR								
30.59	2000	2.876	10.64	0.576	0.00	160	60	29.050
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
30.60	2000	2.872	10.65	0.575	...	160	60	.....
2.15	2165	1.214	1.77	3.460	...	156	60	.....
16.39	2139	2.094	7.83	0.783	...	160	60	.....
32.70	1844	3.083	10.61	0.578	...	163	60	.....
8.27	2150	1.615	5.12	1.197	...	158	58	.....
23.81	2079	2.456	9.69	0.633	...	163	58	.....
18.99	2063	2.222	8.55	0.717	0.00	160	59	29.050

TORQUE (At Dynamometer)									
Eng rpm	1995	1864	1743	1616	1489	1369	1242	1118	993	862
Lb -ft	214.7	218.9	225.8	229.6	234.9	243.3	248.5	248.3	244.5	239.8
Dyn rpm	842	787	736	678	624	570	524	470	417	364

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TESTS F & G—100% MAXIMUM LOAD											
11.27	3267	1.29	1599	17.44	..... Not Recorded				158	64	28.900
20.89	3269	2.40	1600	17.69	..... Not Recorded				167	62	28.950
25.91	2868	3.39	1601	12.43	..... Not Recorded				168	57	28.960
26.88	1882	5.36	1600	7.15	..... Not Recorded				168	58	28.950
26.48	1468	6.76	1600	5.66	..... Not Recorded				166	60	28.900
25.14	681	13.84	1596	2.22	..... Not Recorded				174	60	28.900
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
20.60	2191	3.53	1600	8.81	2.149	9.59	0.640	0.00	166	58	28.939
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
20.33	2302	3.31	1608	15.93	..... Not Recorded				158	46	29.140
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
18.36	2213	3.11	1603	16.98	..... Not Recorded				160	45	29.135

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	309 lb each	None	None
Added cast iron	450 lb each	None	None
Rear tires			
No. and size	Two 11-28	Two 11-28	Two 10-28
Ply	4	4	4
Air pressure	12 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	140 lb each	None	None
Front tires			
No. and size	Two 6:00-19	Two 6:00-19	Two 6:00-19
Ply	4	4	4
Air pressure	26 lb	26 lb	26 lb
Height of drawbar	21½ inches	22½ inches	21 inches
Static weight			
Rear end	3780 lb	2262 lb	2219 lb
Front end	1636 lb	1294 lb	1294 lb
Total weight as tested with operator	5591 lb	3731 lb	3688 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	26.69	35.85
2. Observed maximum horsepower (tests F and B)	25.91	34.89
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	20.02	30.47

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 530.

L. F. LARSEN
Engineer-in-charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open, and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G .

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.